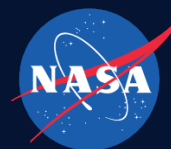


CubeSat Attitude Control System Testbed Project



ABSTRACT

Design, build, and test a CubeSat attitude control system (ACS) testbed that will allow Goddard Space Flight Center (GSFC) CubeSats to test their ACS functionality.

ANTICIPATED BENEFITS

To NASA funded missions:

The testbed will provide an option for NASA funded CubeSat missions to perform more comprehensive tests on their ACS system and reduce the level of risk currently being taken by performing limited tests and relying heavily on mathematical predictions. The reduction in risk would further increase the probably of success for these missions.

To NASA unfunded & planned missions:

The testbed will provide an option for NASA unfunded and planned CubeSat missions to consider performing more comprehensive tests on their ACS system and reduce the level of risk currently being taken by performing limited tests and relying heavily on mathematical predictions. The reduction in risk would further increase the probably of success for these missions.

To other government agencies:

Other government agencies would also be able to utilize the testbed for their CubeSat missions and help increase their probably of success.

To the commercial space industry:

Commercial CubeSat missions could also utilize the testbed for their ACS system testing needs and help increase their probably of success.

To the nation:

The testbed will help CubeSat missions be more successful. This success aides getting information back to earth that is

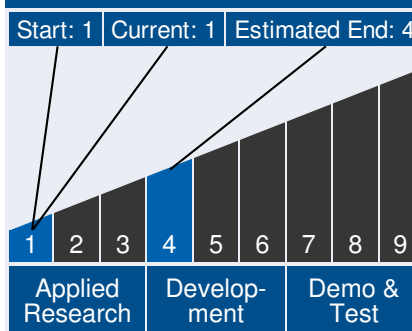


CubeSat with COTS ACS System

Table of Contents

Abstract	1
Anticipated Benefits	1
Technology Maturity	1
Management Team	1
Detailed Description	2
Technology Areas	2
U.S. Work Locations and Key Partners	3
Details for Technology 1	3

Technology Maturity



Management Team

Program Executive:

- Peter Hughes

Program Manager:

- Michael Hitch

Continued on following page.

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beneficial to the nation.

DETAILED DESCRIPTION

The primary objective is to design, build, and test a CubeSat ACS testbed in order to provide technology to buy down risk for GSFC CubeSat missions. The testbed will look to provide the following capabilities:

- Accommodation for CubeSats ranging in size from 1U to 6U
- Three axis movement to allow for phasing demonstration
- Magnetic field simulation to allow magnetic torquer control demonstration
- Light source movement to demonstrate system response to sun sensor inputs
- Dipole measurement to quantify torque capability
- Torque measurement to quantify reaction wheel capability
- Real time data and video capture

The goal of this system will be to test functionality of the ACS and not to develop a detailed performance profile. The main attractiveness is for the engineer to be able to test phasing of different satellite modes. Demonstrating that the satellite responds as expected to both software commands and external inputs is valuable to increasing confidence in the design.

Management Team (cont.)

Project Managers:

- Daniel Mullinix
- Michael Viens

Principal Investigator:

- John Hudeck

Technology Areas

Primary Technology Area:

Modeling, Simulation, Information Technology and Processing (TA 11)

Secondary Technology Area:

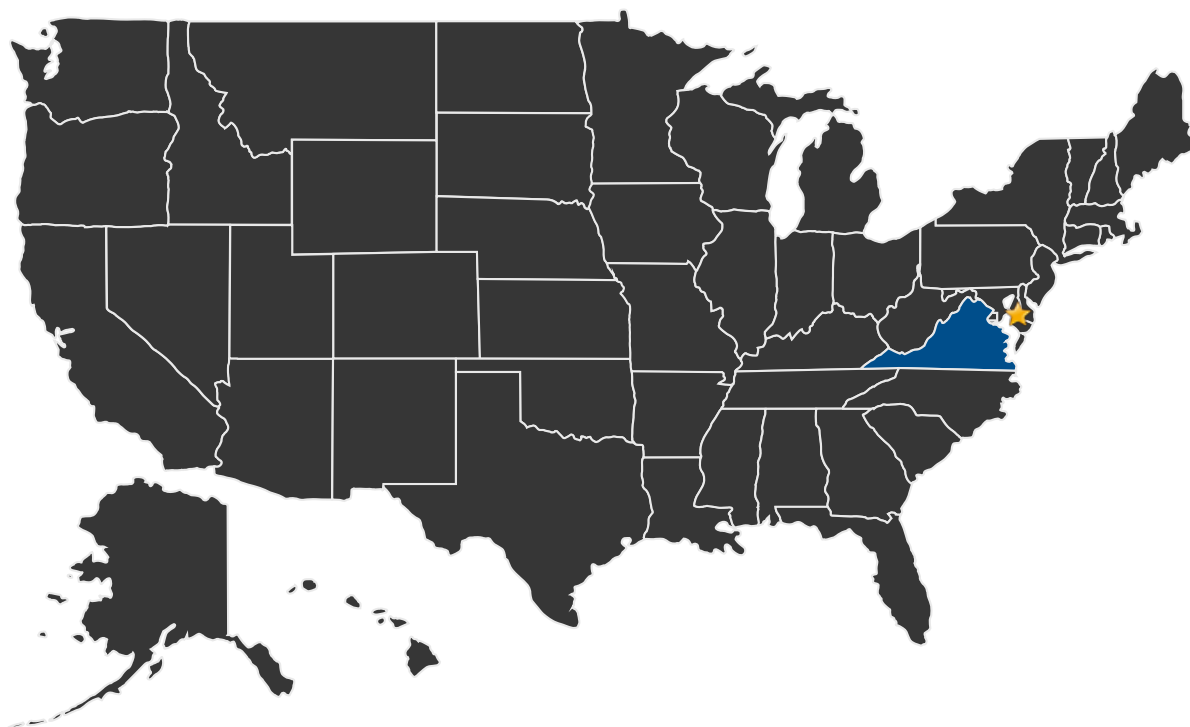
Communications, Navigation, and Orbital Debris Tracking and Characterization Systems (TA 5)

Other Technology Areas:

- Position, Navigation, and Timing (TA 5.4)
- Simulation (TA 11.3)



U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States With Work ★ Lead Center:
Wallops Flight Facility

DETAILS FOR TECHNOLOGY 1

Technology Title

CubeSat Attitude Control System Testbed

Technology Description

This technology is categorized as a hardware system for ground support or mission operations

A testbed designed to test the functionality of CubeSat attitude control systems.

Capabilities Provided

The testbed will aid the ACS engineer in testing ACS system phasing, evaluating responses to magnetic fields and solar light inputs, and gathering dipole and torque measurement data for inputs into their simulations.

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Potential Applications

Provide future CubeSat missions the ability to test their ACS systems at both subsystem and spacecraft system levels.